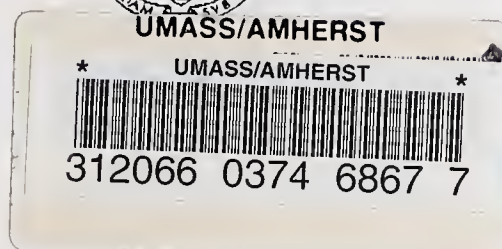


MASS. EA 20.2: H33 / DRAFT / 997



COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
ONE WINTER STREET, BOSTON, MA 02108 617-292-5500



UNIVERSITY OF MASSACHUSETTS
AMHERST, MA 01003

TRUDY COXE
Secretary

DAVID B. STRUHS
Commissioner

January 17, 1997

Dear Reviewer:

Attached for your review is a copy of draft revisions proposed to the Massachusetts Contingency Plan (MCP), 310 CMR 40.0000 and a notice of the public hearing for these proposals. The MCP, promulgated pursuant to M.G.L. c.21E, provides the rules for reporting, assessing and cleaning up releases of oil and/or hazardous material to the environment.

On November 1, 1996, DEP issued a public hearing draft of proposed amendments to the MCP. The revisions proposed in that draft included: changes to implement DEP's new volatile petroleum/extractable petroleum hydrocarbon ("VPH/EPH") approach for characterizing the risks posed by petroleum releases; changes developed as part of the Brownfields Initiative intended to encourage the cleanup and reuse of contaminated sites; a provision allowing DEP to "downgrade" Tier IA sites; criteria DEP may apply to exempt sites from transition provisions; rules for implementing the Pittsfield Pilot Project; and technical corrections. Public hearings on those proposals were held on November 25 and 26, and December 2, 1996.

On the basis of comments received on the proposed VPH/EPH proposals, and additional work DEP has done on the development of standards for petroleum constituents since issuing the November 1st draft, DEP has decided to seek an additional round of comment on the implementation of the VPH/EPH approach and standards. The attached January 17, 1997 public hearing draft includes the revised VPH/EPH proposals. Also in response to comments received on the November draft, additional changes related to the requirements for risk characterization and Response Action Outcomes, including new definitions for "permanent structure" and "engineered barrier", are proposed. In addition, in response to comments, we are proposing to state explicitly that DEP audits should be based upon the standard of care in effect at the time the action being audited was conducted.

Please note that the changes indicated represent changes from the *existing* MCP and not from what was proposed in the November 1, 1996 public hearing draft. New text is indicated by a double underline (redline) and text to be deleted is crossed out (strikeout). "Notes to Reviewers" provide some background on the issues and direct you to particular issues on which DEP is seeking comment.

A public hearing will be held on February 7, 1997 (see attached hearing notice) and the public comment period will run from January 17th through February 21st. Please submit written comments by the close of business on **February 21, 1997** to: Elizabeth Callahan, DEP, Bureau of Waste Site Cleanup, One Winter Street, Boston, MA 02108. DEP intends to promulgate final rules for this package *along with* the previously proposed Special Project provisions and the other amendments contained in the November 1, 1996 public hearing draft in March of 1997.

Thank you for your consideration of these proposals. DEP looks forward to your comments.

Sincerely,

James C. Colman
Assistant Commissioner
Bureau of Waste Site Cleanup



COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
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WILLIAM F. WELD
Governor

ARGEO PAUL CELLUCCI
Lt. Governor

TRUDY COXE
Secretary

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Commissioner

NOTICE OF PUBLIC HEARINGS

The Department of Environmental Protection (DEP) is proposing to amend the Massachusetts Contingency Plan (310 CMR 40.0000, the "MCP"), which is promulgated pursuant to M.G.L. Chapter 21E (the Massachusetts "Superfund" Law). Proposed amendments to 310 CMR 40.0000 include:

- changes to the reporting criteria and cleanup standards to implement the new volatile petroleum hydrocarbon/extractable petroleum hydrocarbon analytical methods and toxicological approach for assessing petroleum releases. (**Please note:** public comment was sought on this topic in a previous public hearing draft, dated November 1, 1996. As a result of the comment received and further development of these proposals, DEP is seeking additional comment on this set of changes.); and
- proposed definitions for "permanent structure" and "engineered barrier". Both terms apply to the requirements for risk characterization and achieving a permanent solution.

To obtain public comment on the proposed regulations, DEP will hold a public hearing in accordance with M.G.L. Chapter 30A in BOSTON on February 7, 1997, One Ashburton Place, 21st Flr., 9:30 a.m..

Testimony may be presented orally and/or in writing at the public hearings. The period for accepting written testimony will remain open until close of business on February 21, 1997. Please submit written testimony to: Elizabeth Callahan, Department of Environmental Protection, Bureau of Waste Site Cleanup, 5th Floor, One Winter Street, Boston, MA 02108.

In accordance with the Massachusetts Environmental Policy Act (MEPA, M.G.L. c. 30, §§ 61-62H, and 311 CMR 11.00), DEP filed an Environmental Notification Form (ENF) with the Secretary of Environmental Affairs on the regulatory revisions proposed in the November 1, 1997 public hearing draft. Because DEP is seeking an additional round of comment on some of those proposals, the Secretary has held the comment period of the ENF open until February 10, 1997. The public hearing on the proposed amendments will be considered to be a consultation session on the project. All persons wishing to respond to the ENF should submit written comments to: Secretary of Environmental Affairs, 100 Cambridge Street, Boston, MA 02202, Attention: MEPA Unit.

Copies of the proposed regulations are available from DEP's Bureau of Waste Site Cleanup. To obtain a copy free of charge, please write to: Public Participation Branch, Bureau of Waste Site Cleanup, One Winter Street, Boston, MA 02108; or call (617) 556-1148. Copies are also available through the DEP Computer Bulletin Board System, Modem: (617) 292-5546 (14400 BPS, 8 data, 1 stop, no parity); and from DEP's World Wide Web site at <http://www.magnet.state.ma.us/dep/bwsc>.



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**REVISIONS TO
THE MASSACHUSETTS CONTINGENCY PLAN,
310 CMR 40.0000**

PUBLIC HEARING DRAFT

January 17, 1997

PROPOSED CHANGES RELATED TO THE VPH/EPH APPROACH

Notes to Reviewers: On November 1, 1996, DEP issued a public hearing draft of proposed amendments to the MCP, including changes to implement DEP's new volatile petroleum/extractable petroleum hydrocarbon ("VPH/EPH") approach for characterizing the risks posed by petroleum releases. On the basis of comments received on the proposed VPH/EPH proposals, and additional work DEP has done on the development of standards for petroleum constituents since issuing the November 1st draft, DEP has decided to seek an additional round of comment on the implementation of the VPH/EPH approach and standards.

GW-2 Standards

Considerable comments were received by DEP on the VPH/EPH aliphatic and aromatic hydrocarbon GW-2 standards proposed in the November 1, 1996 Public Comment Draft. Most commentors expressed serious reservations over the low GW-2 values proposed, relative to implementation concerns, background issues, and analytical detection limitations.

GW-2 standards are designed to be protective of exposures that could occur to occupants of buildings which lie over an area of contaminated groundwater. The standards proposed in the November draft were calculated using the same assumptions and algorithms DEP employed to calculate GW-2 standards in the 1993 MCP. Additional detail in this regard may be obtained by reviewing DEP documents entitled "Background Documentation for the Development of the MCP Numerical Standards", April, 1994, and "Issue Paper - Implementation of VPH/EPH Approach", May, 1996.

Although exposures via this pathway have proven to be a significant health concern at a number of contaminated sites, the phenomenon is, at present, difficult to evaluate or predict, even for individual, relatively well-characterized compounds like benzene and trichloroethylene. Additional uncertainties are introduced when attempting to calculate GW-2 standards for the collective VPH/EPH hydrocarbon fractions, including:

- The aliphatic and aromatic fractions of interests are composed of tens or even hundreds of individual hydrocarbon compounds, and insufficient information is currently available to predict how this collective grouping of contaminants will behave in the environment. Of particular interest is the extent of biodegradation that will occur in the saturated and vadose zones, and to what degree this degradation reduces concerns over indoor air impacts.
- Even if one is able to adequately predict indoor air concentrations resulting from this phenomenon, the health significance of such levels are not fully understood.
- Finally, the hydrocarbon compounds comprising the VPH/EPH fractions are presumably present in most homes and building at "background" levels, although data in this regard is extremely limited. Nonetheless, it is quite possible that background levels of such compounds may be significantly higher than the protective levels for which some of the November GW-2 standards were designed.

Since issuance of the November 1st public hearing draft, DEP has had an opportunity to more fully review data and conclusions contained in two new scientific efforts relevant to this concern:

- o In late October, 1996, a national workgroup, the Total Petroleum Hydrocarbon Criteria Working Group (TPHCWG) issued draft final reports on the toxicity and fate of hydrocarbons released to the environment. TPHCWG is comprised of representatives of state and federal regulatory agencies, oil companies, consulting firms, academia, and the U.S. military. Included in these documents were recommended (inhalation) Reference Concentrations (RfCs) for collective aliphatic and aromatic fractions. A number of recommended RfCs were significantly higher (i.e., less conservative) than the default/derived values assumed by DEP in calculating the November 1996 GW-2 standards; in some cases, by more than an order of magnitude.

- o Also in late October, DEP completed an internal evaluation of indoor-air impacts at 21E sites. The results of this evaluation, which were presented by DEP at the annual Soils Conference at the University of Massachusetts in Amherst, provided additional insight into this exposure pathway. Among the key preliminary findings of this study was that petroleum hydrocarbons appear to have less of an impact on indoor air than originally assumed, due presumably to their biodegradation rates. Quantitative findings suggest that groundwater-to-soil-gas partitioning factors were an order of magnitude less than assumed by DEP in calculating the November 1996 draft standards.

Unfortunately, the work cited above cannot be fully adopted by DEP at this time, as the proposed RfC values have not been peer-reviewed, and, in some cases, are based upon unreleased studies. Nonetheless, it does suggest that previously proposed GW-2 standards may significantly overestimate concerns on these hydrocarbon fractions.

This leaves DEP with 3 options:

- (1) do not calculate GW-2 standards at this time;
- (2) continue to use the conservative values previously proposed; or
- (3) designate interim GW-2 values based upon DEP's professional judgment, designed to be protective, but not overly conservative.

DEP recommends option (3), on the basis that (a) the previously proposed standards calculated using the most defensible assumptions are too conservative, and would not be workable, and (b) a lack of GW-2 standards altogether may not be health-protective, and would otherwise require all parties to undertake Method 2 or Method 3 MCP risk characterization processes at all sites.

The GW-2 standards proposed in this public hearing draft are therefore based upon DEP's professional judgment, and are believed to be health protective at most sites. They were derived based upon a consideration of the following:

- * the parameters, equations and methodologies used to develop the 1993 MCP GW-2 standards;
- * the issues, concerns, assumptions and recommendations contained in the May 1996 Issues Paper;
- * the information, data, and recommendations contained in the TPHCWG October 1996 draft final reports;
- * the preliminary results and findings of DEP's study of indoor air impacts at 21E sites; and
- * limited available information on background levels of hydrocarbon contaminants in indoor air.

No GW-2 standard is proposed or necessary for the C₁₉ - C₃₆ Aliphatic Hydrocarbons, which may be considered non-volatile. A value of 1000 µg/L is proposed for each of the remaining aliphatic fractions, based upon the following justifications:

- The November 1996 proposed GW-2 standard for the C₅ - C₈ Aliphatic fraction, 20 µg/L, was based upon a protective indoor-air concentration value of 40 µg/m³, which is 20% of the RfC for n-hexane. The TPHCWG report suggests that hydrocarbons within this range are considerably less toxic than n-hexane, and, based upon a preliminary review, there appears to be some merit to this position. This consideration, together with the findings of the DEP indoor-air impact study suggesting that hydrocarbon contaminants will partition in the vadose zone at concentrations one order of magnitude lower than assumed by the 1993 MCP GW-2 development equations, have given the Agency confidence to suggest the 1000 µg/L value, which is approximately two orders of magnitude higher than the November proposal.

- The TPHCWG report recommends a lower RfC for the heavier aliphatic fractions ($1000 \mu\text{g}/\text{m}^3$), relative to the value used by DEP to calculate the November 1996 GW-2 standards for the C_9 - C_{12} and C_9 - C_{18} Aliphatic fractions ($2000 \mu\text{g}/\text{m}^3$). However, given the facts that (a) the TPHCWG recommendation is based upon unreleased and non-peer reviewed and (b) the likelihood that significant concentrations of such hydrocarbons may be present as a background indoor-air condition, the Agency is recommending GW-2 values of $1000 \mu\text{g}/\text{L}$ for these heavier ranges, which is approximately one order of magnitude higher than originally proposed in the November draft. DEP's evaluation of indoor air impacts indicate that this standard would be reasonably protective.

Higher concentrations are also being proposed for the aromatic fractions:

- The November 1996 proposed GW-2 standard for the C_9 - C_{10} Aromatic fraction, $100 \mu\text{g}/\text{L}$, was based upon a protective indoor-air concentration value of $2 \mu\text{g}/\text{m}^3$, which is 20% of the RfC for benzene. Once again, the TPHCWG report suggests that hydrocarbons within this range are considerably less toxic than benzene. Given that RfCs for toluene, ethylbenzene, and xylenes are an order of magnitude higher than benzene, and given the predominance of alkyl-benzenes in the C_9 - C_{10} Aromatic fraction, DEP agrees that the use of a benzene standard appears too conservative for this fraction. This conclusion, together with the findings of the DEP indoor-air impact study, have given the agency confidence to raise the proposed GW-2 standard for this range to $5000 \mu\text{g}/\text{L}$. However, given the likely odor recognition thresholds for compounds within this range, concern would exist that concentrations in excess of this level may produce odors within impacted structures.
- Although the RfC recommended by TPHCWG for the heavier aromatic fractions ($200 \mu\text{g}/\text{m}^3$) is close to the value used by DEP ($71 \mu\text{g}/\text{m}^3$) in calculating the proposed November 1996 GW-2 standard for C_{11} - C_{22} Aromatics, in consideration of the findings of the DEP indoor-air impact study, the agency is proposing to raise this value from $9000 \mu\text{g}/\text{L}$ to $50,000 \mu\text{g}/\text{L}$.

Comments on the above are requested. In particular, additional or contrary technical arguments on appropriate values for GW-2 standards, and/or any field data or insight on indoor air impacts and "background" concentrations, would be welcomed.

Lastly, note that DEP is initiating a peer-review process to further evaluate the data and recommendation contained in the TPHCWG reports. Based upon the results of this process, additional guidance and/or regulatory changes may be issued on this subject by DEP on a future date.

Solubility Concerns When Calculating Method 1 Standards

DEP is proposing that the solubility ceilings be removed from the calculation of the Method 1 groundwater standards - not only for the VPH/EPH fractions, but also PAHs and all other Method 1 standards (See Table 1 below). Raising the Method 1 groundwater standards to by eliminating the solubility consideration will also effect the leaching-based soil concentrations for a number of chemicals, as shown in Tables 2, 3 and 4 below, as well as a number of Reportable Concentrations in Soil (RC Table, below).

The original intent of the solubility ceiling was to ensure that undissolved OHM was not present in groundwater, as this could represent a continuing source. While this is a valid and meritorious objective, it has become increasingly clear that common sampling methods are unable to differentiate between real concerns of this nature, and monitoring well anomalies resulting from the localized presence of colloidal NAPL suspensions, and/or sorbed

OHM on suspended sediment. Comment is sought on whether it is worth the cost of non-routine sampling techniques (e.g., extensive filtering, centrifuging) to address this concern, or do other MCP requirements (e.g., the NAPL UCL and the requirement to eliminate or control continuing sources) provide sufficient protection?

GW-3 Standards for the Petroleum Hydrocarbon Fractions

In the absence of USEPA derived Ambient Water Quality Criteria, MADEP based the proposed GW-3 standards on the aquatic toxicity information described below. Comment is sought on the appropriateness of these values *and alternatives*. In addition, DEP has received comments that, given the relative immobility of some of the longer chain hydrocarbon fractions, a dilution/attenuation factor greater than 10 (perhaps 50 or 100) would be appropriate for these fractions.

- The GW-3 standard for the C5-C8 Aliphatic Hydrocarbons is based upon the aquatic toxicity of n-hexane: EC50(45 mmol/m³)/10 - *Daphnia magna*. This is an estimate of a low-effects levels in various aquatic species, not USEPA derived Ambient Water Quality Criteria
- The GW-3 standard for the C9-C12 and C9-C18 Aliphatic Hydrocarbons is based upon the aquatic toxicity of decane: *Daphnia* mortality - Lowest LC50 (18,000 µg/L) /10. This is an estimate of a low-effects levels in various aquatic species, not USEPA derived Ambient Water Quality Criteria.
- The GW-3 standard for the C9-C10 Aromatic Hydrocarbons is based upon the aquatic toxicity of ethylbenzene. Comment is sought on the appropriateness of these values and alternatives. Given the relative immobility of this fraction and the range of aquatic toxicity which might be expected, DEP also seeks comment on whether a dilution factor greater than 10 would be appropriate.
- The GW-3 standard for the C11-C22 Aromatic Hydrocarbons is based upon the aquatic toxicity of PAHs. Comment is sought on the appropriateness of these values and alternatives. Given the relative immobility of this fraction and the range of aquatic toxicity which might be expected, DEP also seeks comment on whether a dilution factor greater than 10 would be appropriate.

Leaching-Based Soil Concentrations

Please Note: Due to a correction of an earlier computational error in the Henry's Law Constant for the Aromatic Hydrocarbon fractions, several of the proposed soil standards listed in Tables 2, 3 and 4 are lower than those proposed in the November 1, 1996 draft. (The values are footnoted in the Tables.)

Use of the Proposed Standards In a Method 2 Risk Characterization

NOTE: Pursuant to 310 CMR 40.0982, the proposed Method 1 standards, Method 2 Direct Contact Values and Upper Concentration Limits which follow may be used at the RP's, PRP's or Other Person's option to characterize risk at a disposal site prior to the final promulgation of these standards. Risk characterizations making use of these standards during this time period shall be considered a Method 2 Risk Characterization.

These proposed Method 1 standards SUPERSEDE the corresponding values published in the November 1, 1996 proposal. *The Reportable Concentrations listed below cannot be used until the final promulgation of these regulations.*

Transitioning of New VPH/EPH Approach

While the transitioning of the new VPH/EPH approach is not a formal part of this regulations package, DEP is working with LSPs, the regulated community and the public to ensure the successful implementation of this new methodology. The following discussion summarizes the history of this effort and highlights several important issues that will be addressed as DEP finalizes this approach.

As part of the program redesign in 1993, the MCP was written as a performance-based set of rules. In order to avoid micro-management of site cleanups, and be responsive to changes and advancements in science and technology, the MCP purposely avoids prescriptive mandates on how to conduct site assessments, what chemicals to evaluate, or what analytical test methods to use. For example, the MCP does not specify a requirement to test for the presence of cyanides at Manufactured Gas Plant sites. Such decisions (and responsibilities) are deferred to Licensed Site Professionals (LSPs), pursuant to the Response Action Performance Standard (RAPS) concept and provisions of 310 CMR 40.0191.

For years, scientists in the public and private sectors have struggled over how to best characterize petroleum contaminated sites. Of particular concern was the standard use of indicator compounds, like benzene, toluene, ethylbenzene, xylenes (BTEX) and methyl-tertiary-butylether (MTBE), to characterize risks posed by gasoline releases. Specifically, the use of an indicator-only approach can significantly underestimate risks posed by gasoline, since these indicator compounds comprise only about 25% of gasoline. Nevertheless, suitable alternatives were not readily available until August, 1994, when DEP first proposed the VPH/EPH concept and methodology.

DEP believes the new VPH/EPH approach represents a better way to characterize petroleum releases, an advancement in the science of site assessment and risk characterization, and a level of diligence commensurate with the RAPS provisions. Consequently, and consistent with the basic premise of the new MCP, no regulatory mandate is proposed in the MCP to start using the new approach. Rather, use of the new approach by LSPs would be expected as a "good science" RAPS issue, the details of which DEP has publicly promoted for over 2 years.

Nonetheless, DEP is sensitive to concerns about the potential application of new scientific methods to response actions which are completed or substantially completed. Accordingly, we are seeking to find a reasonable balance between the need to adequately protect human health, public welfare, and the environment, and the need of parties conducting work at sites for certainty with respect to cleanup requirements.

DEP is proposing to pursue the transitioning of the VPH/EPH approach in the following manner:

- After the effective date of the new VPH/EPH standards, all submittals received by DEP would be expected to address the risk concerns and issues characterized by the VPH/EPH approach, within the context of RAPS. Consideration could be given to "grandfathering" sites that have reached a certain milestone by this effective date (e.g., RAO, Phase III Completion Statement).
- While DEP would not as a general practice expect or require the application and use of the VPH/EPH approach for sites closed or grandfathered prior to the specified effective date, it would reserve the right to do so, in cases where compelling health or environmental concerns are evident (e.g., active drinking water well impacted by a release of gasoline).

DEP looks forward to working with the regulated community, the BWSC Advisory Committee and the public to develop guidance on the implementation of the VPH/EPH methodology. DEP encourages commentors to consider how the new VPH/EPH approach should be incorporated and transitioned into the waste site cleanup process regulated by the Massachusetts Contingency Plan (MCP). Comments on this proposal are requested, together with recommendations on the effective date of these provisions (*What period of time would be appropriate to prepare for implementation?*) and "grandfathering" issues and alternatives.

SEE ATTACHED TABLES AND SPREADSHEETS FOR DETAILS
OF THE DERIVATION OF THE STANDARDS

***** PROPOSED REGULATIONS FOLLOW *****

Changes to MCP Table 1 - 310 CMR 40.0974(2)

Oil or Hazardous Material	Old GW-1 µg/L	New GW-1 µg/L	Old GW-2 µg/L	New GW-2 µg/L	Old GW-3 µg/L	New GW-3 µg/L
TOTAL PETROLEUM HYDROCARBON	1,000	400 ¹	N/A	2,000 ¹	50,000	6,000 ²
C ₅ through C ₈ Aliphatic Hydrocarbons	-	400 ³	-	1,000 ⁵	-	40,000 ^{3,7}
C ₉ through C ₁₂ Aliphatic Hydrocarbons	-	4,000 ³	-	1,000 ⁵	-	20,000 ^{3,8}
C ₉ through C ₁₈ Aliphatic Hydrocarbons	-	4,000 ³	-	1,000 ⁵	-	20,000 ^{3,8}
C ₁₉ through C ₃₆ Aliphatic Hydrocarbons	-	5,000 ⁴	-	N/A ⁶	-	50,000 ⁹
C ₉ through C ₁₀ Aromatic Hydrocarbons	-	200 ³	-	5,000 ⁵	-	4,000 ^{3,10}
C ₁₁ through C ₂₂ Aromatic Hydrocarbons	-	200 ³	-	50,000 ⁵	-	3,000 ^{3,11}
CHANGES BASED ON SOLUBILITY:						
ACENAPHTHENE	No Change (20)		No Change (NA)		2,000	5,000 ¹²
ACENAPHTHYLENE	No Change (300)		No Change (NA)		2,000	3,000 ¹²
ALDRIN	No Change (0.5)		No Change (0.5)		9	10 ¹²
ANTHRACENE	600	2,000 ¹²	No Change (NA)		600	3,000 ¹²
BENZO[a]ANTHRACENE	No Change (1)		No Change (NA)		5	3,000 ¹²
BENZO[a]PYRENE	No Change (0.2)		No Change (NA)		2	3,000 ¹²
BENZO[b]FLUORANTHENE	No Change (1)		No Change (NA)		7	3,000 ¹²
BENZO[g,h,i]PERYLENE	No Change (0.5)		No Change (NA)		0.5	3,000 ¹²
BENZO[k]FLUORANTHENE	No Change (1)		No Change (NA)		1	3,000 ¹²
1,1-BIPHENYL	No Change (400)		No Change (NA)		4,000	50,000 ¹²
BIS(2-ETHYLHEXYL)PHTHALATE	No Change (6)		700	50,000 ¹²	No Change (30)	
CHRYSENE	No Change (2)		No Change (NA)		3	3,000 ¹²
DIBENZO(a,h)ANTHRACENE	No Change (0.5)		No Change (NA)		0.5	3,000 ¹²
3,3'-DICHLOROBENZIDINE	No Change (80)		No Change (NA)		2,000	50,000 ¹²
p,p'-DICHLORODIPHENYLDICHLOROETHYLENE (DDE)	No Change (0.1)		No Change (NA)		20	100 ¹²
FLUORANTHENE	100	300 ¹²	No Change (NA)		100	200 ¹²
FLUORENE	No Change (300)		No Change (NA)		1,000	3,000 ¹²
INDENO[1,2,3-cd]PYRENE	No Change (0.5)		No Change (NA)		0.5	3,000 ¹²
2-METHYLNAPHTHALENE	No Change (10)		10,000	20,000 ¹²	No Change (3000)	
PYRENE	80	200 ¹²	No Change (NA)		80	3,000 ¹²

NOTES FOR TABLE I:

- "No Change" means no change from the current MCP.
1. The new GW-2 standard for traditional TPH results used as a conservative screening tool, set at twice the lowest fractional standard.
 2. The new GW-3 standard for traditional TPH results used as a conservative screening tool, set at twice the lowest fractional standard.
 3. Risk-Based standard. See attached spreadsheets for derivation.
 4. The GW-1 standard for C₁₉ - C₃₆ Aliphatic Hydrocarbons is based upon taste and odor concerns for drinking water.
 5. This GW-2 standard is based upon a collection of information -- not a single risk value -- as discussed in detail in the preceding *Note To Reviewers*.
 6. Given the low volatility of the compounds in this fraction, the GW-2 standard is considered "Not Applicable".
 7. The GW-3 standard for the C₅-C₈ Aliphatic Hydrocarbons is based upon the aquatic toxicity of n-hexane: EC50(45 mmol/m³)/10 - Daphnia magna. This is an estimate of a low-effects levels in various aquatic species, not USEPA derived Ambient Water Quality Criteria. Comment is sought on the appropriateness of these values and alternatives.
 8. The GW-3 standard for the C₉-C₁₂ and C₉-C₁₈ Aliphatic Hydrocarbons is based upon the aquatic toxicity of decane: Daphnia mortality - Lowest LC50 (18,000 ug/L) /10. This is an estimate of a low-effects levels in various aquatic species, not USEPA derived Ambient Water Quality Criteria. Comment is sought on the appropriateness of these values and alternatives.
 9. The GW-3 standard for the C₁₉-C₃₆ Aliphatic Hydrocarbons is based upon the groundwater Ceiling Concentration.
 10. The GW-3 standard for the C₉-C₁₀ Aromatic Hydrocarbons is based upon the aquatic toxicity of ethylbenzene. Comment is sought on the appropriateness of these values and alternatives. Given the relative immobility of this fraction and the range of aquatic toxicity which might be expected, DEP also seeks comment on whether a dilution factor greater than 10 would be appropriate.
 11. The GW-3 standard for the C₁₁-C₂₂ Aromatic Hydrocarbons is based upon the aquatic toxicity of PAHs. Comment is sought on the appropriateness of these values and alternatives. Given the relative immobility of this fraction and the range of aquatic toxicity which might be expected, DEP also seeks comment on whether a dilution factor greater than 10 would be appropriate.
 12. This groundwater standard reflects the allowable concentration following the standard protocol described in the document *Background Documentation for the Development of the MCP Numerical Standards* (May 1994), except that the standard has not been adjusted for solubility. See *Note To Reviewers* above.

Changes to MCP Table 2 - 310 CMR 40.0975(6)(a)

Oil or Hazardous Material	Old		New		Old		New		Old		New	
	S-1/GW-1	µg/g	S-1/GW-1	µg/g	S-1/GW-2	µg/g	S-1/GW-2	µg/g	S-1/GW-3	µg/g	S-1/GW-3	µg/g
TOTAL PETROLEUM HYDROCARBON	No Change (500)		No Change (500)		No Change (500)		No Change (500)		No Change (500)		No Change (500)	
C ₅ through C ₈ Aliphatic Hydrocarbons	-		100 ²		-		100 ²		-		100 ²	
C ₉ through C ₁₂ Aliphatic Hydrocarbons	-		1,000 ²		-		1,000 ²		-		1,000 ²	
C ₉ through C ₁₈ Aliphatic Hydrocarbons	-		1,000 ²		-		1,000 ²		-		1,000 ²	
C ₁₉ through C ₃₆ Aliphatic Hydrocarbons	-		2,500 ²		-		2,500 ²		-		2,500 ²	
C ₉ through C ₁₀ Aromatic Hydrocarbons	-		100 ²		-		100 ²		-		100 ²	
C ₁₁ through C ₂₂ Aromatic Hydrocarbons	-		200 ¹		-		800 ²		-		800 ²	
CHANGES BASED ON SOLUBILITY												
BENZO[g,h,i]PERYLENE	100		1,000 ²		No Change (1,000)		No Change (1,000)		100		1,000 ²	
1,1-BIPHENYL	No Change (1)		No Change (1)		No Change (1,000)		No Change (1,000)		10		100 ¹	
FLUORANTHENE	600		1,000 ²		No Change (1,000)		No Change (1,000)		600		1,000 ²	
PYRENE	500		700 ²		No Change (700)		No Change (700)		500		700 ²	

Notes for Table 2:

- "No Change" means no change from the current MCP.
- 1. The proposed standard is based upon leaching-to-groundwater pathway which results in a more stringent (lower) than the direct contact standard (Table 5).
- 2. The proposed standard is based on the direct contact standard (Table 5) as the leaching-to-groundwater pathway results in a higher soil concentration.

Changes to MCP Table 3 - 310 CMR 40.0975(6)(b)

Oil or Hazardous Material	Old S-2/GW-1		New S-2/GW-1		Old S-2/GW-2		New S-2/GW-2		Old S-2/GW-3		New S-2/GW-3	
	µg/g	No Change (2,500)	µg/g	No Change (2,500)	µg/g	No Change (2,500)	µg/g	No Change (2,500)	µg/g	No Change (2,500)	µg/g	No Change (2,500)
TOTAL PETROLEUM HYDROCARBON												
	C ₅ through C ₈ Aliphatic Hydrocarbons	-	500 ²	500 ²	-	500 ²	500 ²	500 ²	-	500 ²	500 ²	500 ²
	C ₉ through C ₁₂ Aliphatic Hydrocarbons	-	2,500 ²	2,500 ²	-	2,500 ²	2,500 ²	2,500 ²	-	2,500 ²	2,500 ²	2,500 ²
	C ₉ through C ₁₈ Aliphatic Hydrocarbons	-	2,500 ²	2,500 ²	-	2,500 ²	2,500 ²	2,500 ²	-	2,500 ²	2,500 ²	2,500 ²
	C ₁₉ through C ₃₆ Aliphatic Hydrocarbons	-	5,000 ²	5,000 ²	-	5,000 ²	5,000 ²	5,000 ²	-	5,000 ²	5,000 ²	5,000 ²
	C ₉ through C ₁₀ Aromatic Hydrocarbons	-	300 ¹	300 ¹	-	500 ²	500 ²	500 ²	-	500 ²	500 ²	500 ²
	C ₁₁ through C ₂₂ Aromatic Hydrocarbons	-	200 ¹	200 ¹	-	2,000 ²	2,000 ²	2,000 ²	-	2,000 ²	2,000 ²	2,000 ²
CHANGES BASED ON SOLUBILITY												
ACENAPHTHENE ACENAPHTHYLENE ANTHRACENE BENZO[g,h,i]PERYLENE 1,1-BIPHENYL FLUORANTHENE FLUORENE PYRENE		No Change (20)		No Change (2,500)		No Change (2,500)		No Change (2,500)		No Change (2,500)		No Change (2,500)
		No Change (100)		No Change (2,500)		No Change (2,500)		No Change (2,500)		No Change (2,500)		No Change (2,500)
		1,000	2,500 ²		No Change (2,500)		No Change (2,500)		No Change (2,500)		No Change (2,500)	
		100	2,500 ²		No Change (2,500)		No Change (2,500)		No Change (2,500)		No Change (2,500)	
		No Change (1)		No Change (2,500)		No Change (2,500)		No Change (2,500)		No Change (2,500)		No Change (2,500)
		600	2,000 ¹		No Change (2,000)		No Change (2,000)		No Change (2,000)		No Change (2,000)	
		No Change (400)		No Change (2,000)		No Change (2,000)		No Change (2,000)		No Change (2,000)		No Change (2,000)
		500	1,000 ¹		No Change (2,000)		No Change (2,000)		No Change (2,000)		No Change (2,000)	

Notes for Table 3:

- "No Change" means no change from the current MCP.
- 1. The proposed standard is based upon leaching-to-groundwater pathway which results in a more stringent (lower) than the direct contact standard (Table 5).
- 2. The proposed standard is based on the direct contact standard (Table 5) as the leaching-to-groundwater pathway results in a higher soil concentration.

Changes to MCP Table 4 - 310 CMR 40.0975(6)(c)						
Oil or Hazardous Material	Old S-3/GW-1 µg/g	New S-3/GW-1 µg/g	Old S-3/GW-2 µg/g	New S-3/GW-2 µg/g	Old S-3/GW-3 µg/g	New S-3/GW-3 µg/g
TOTAL PETROLEUM HYDROCARBON	No Change (5,000)		No Change (5,000)		No Change (5,000)	
C ₅ through C ₈ Aliphatic Hydrocarbons	-	500 ²	-	500 ²	-	500 ²
C ₉ through C ₁₂ Aliphatic Hydrocarbons	-	5,000 ²	-	5,000 ²	-	5,000 ²
C ₉ through C ₁₈ Aliphatic Hydrocarbons	-	5,000 ²	-	5,000 ²	-	5,000 ²
C ₁₉ through C ₃₆ Aliphatic Hydrocarbons	-	5,000 ²	-	5,000 ²	-	5,000 ²
C ₉ through C ₁₀ Aromatic Hydrocarbons	-	300 ¹	-	500 ²	-	500 ²
C ₁₁ through C ₂₂ Aromatic Hydrocarbons	-	200 ¹	-	5,000 ²	-	3,000 ¹
CHANGES BASED ON SOLUBILITY						
ACENAPHTHENE	No Change(20)		No Change(5,000)		2,000	4,000 ¹
ACENAPHTHYLENE	No Change(100)		No Change(2,500)		800	1,000 ¹
ANTHRACENE	1,000	5,000 ²	No Change(5,000)		1,000	5,000 ²
BENZO[g,h,i]PERYLENE	100	2,500 ²	No Change(2,500)		100	2,500 ²
1,1-BIPHENYL	No Change(1)		No Change (3,000)		10	100 ¹
FLUORANTHENE	600	2,000 ¹	No Change (5,000)		600	1,000 ¹
FLUORENE	No Change(400)		No Change(5,000)		1,000	4,000 ¹
PYRENE	500	1,000 ¹	No Change(5,000)		500	5,000 ²

Notes for Table 4:

- "No Change" means no change from the current MCP.
- 1. The proposed standard is based upon leaching-to-groundwater pathway which results in a more stringent (lower) than the direct contact standard (Table 5).
- 2. The proposed standard is based on the direct contact standard (Table 5) as the leaching-to-groundwater pathway results in a higher soil concentration.

Changes to MCP Table 5 - 310 CMR 40.0985(6)

Oil or Hazardous Material	Old	New	Old	New	Old	New
	S-1 µg/g	S-1 µg/g	S-2 µg/g	S-2 µg/g	S-3 µg/g	S-3 µg/g
TOTAL PETROLEUM HYDROCARBON	No Change (500)	No Change (500)	No Change (2,500)	No Change (2,500)	No Change (5,000)	No Change (5,000)
C ₅ through C ₈ Aliphatic Hydrocarbons	-	100 ¹	-	500 ¹	-	500 ¹
C ₉ through C ₁₂ Aliphatic Hydrocarbons	-	1,000 ¹	-	2,500 ¹	-	5,000 ¹
C ₉ through C ₁₈ Aliphatic Hydrocarbons	-	1,000 ¹	-	2,500 ¹	-	5,000 ¹
C ₁₉ through C ₃₆ Aliphatic Hydrocarbons	-	2,500 ¹	-	5,000 ¹	-	5,000 ¹
C ₉ through C ₁₀ Aromatic Hydrocarbons	-	100 ¹	-	500 ¹	-	500 ¹
C ₁₁ through C ₂₂ Aromatic Hydrocarbons	-	800 ²	-	2,000 ²	-	5,000 ¹

Notes for Table 5:

- "No Change" means no change from the current MCP.
1. The proposed standard is based upon the applicable Ceiling Concentration.
 2. The proposed standard is risk-based.

Changes to MCP Table 6 - 310 CMR 40.0996(5)

Oil or Hazardous Material	Old UCL in Groundwater µg/L		New UCL in Groundwater µg/L		Old UCL in Soil µg/g		New UCL in Soil µg/g	
	100,000	-	60,000 ^{1,3}	-	No Change (10,000)	-	No Change (10,000)	-
TOTAL PETROLEUM HYDROCARBON								
C ₅ through C ₈ Aliphatic Hydrocarbons	-		100,000 ^{2,3}		-		5,000 ^{2,3}	
C ₉ through C ₁₂ Aliphatic Hydrocarbons	-		100,000 ^{2,3}		-		20,000 ^{2,3}	
C ₉ through C ₁₈ Aliphatic Hydrocarbons	-		100,000 ^{2,3}		-		20,000 ^{2,3}	
C ₁₉ through C ₃₆ Aliphatic Hydrocarbons	-		100,000 ^{2,3}		-		20,000 ^{2,3}	
C ₉ through C ₁₀ Aromatic Hydrocarbons	-		100,000 ^{2,3}		-		5,000 ^{2,3}	
C ₁₁ through C ₂₂ Aromatic Hydrocarbons	-		100,000 ^{2,3}		-		10,000 ^{2,3}	
CHANGES BASED ON SOLUBILITY:								
ACENAPHTHENE	2,000		50,000 ³		No Change (10,000)		No Change (10,000)	
ACENAPHTHYLENE	2,000		30,000 ³		No Change (10,000)		No Change (10,000)	
ALDRIN	9		100 ³		No Change (1)		No Change (1)	
ANTHRACENE	600		30,000 ³		No Change (10,000)		No Change (10,000)	
BENZO[a]ANTHRACENE	5		30,000 ³		No Change (100)		No Change (100)	
BENZO[a]PYRENE	2		30,000 ³		No Change (100)		No Change (100)	
BENZO[b]FLUORANTHENE	7		30,000 ³		No Change (100)		No Change (100)	
BENZO[g,h,i]PERYLENE	0.5		30,000 ³		No Change (10,000)		No Change (10,000)	
BENZO[k]FLUORANTHENE	1		30,000 ³		No Change (400)		No Change (400)	
1,1-BIPHENYL	4,000		100,000 ³		No Change (10,000)		No Change (10,000)	
BIS(2-ETHYLHEXYL)PHTHALATE	700		100,000 ³		No Change (10,000)		No Change (10,000)	
CHRYSENE	3		30,000 ³		No Change (400)		No Change (400)	
DIBENZO(a,h)ANTHRACENE	0.5		30,000 ³		No Change (100)		No Change (100)	
3,3'-DICHLOROBENZIDINE	2,000		100,000 ³		No Change (30)		No Change (30)	
DDE	20		1,000 ³		No Change (90)		No Change (90)	
FLUORANTHENE	100		3,000 ³		No Change (10,000)		No Change (10,000)	
FLUORENE	1,000		30,000 ³		No Change (10,000)		No Change (10,000)	
INDENO[1,2,3-cd]PYRENE	0.5		30,000 ³		No Change (100)		No Change (100)	
2-METHYLNAPHTHALENE	10,000		100,000 ³		No Change (10,000)		No Change (10,000)	
PYRENE	80		30,000 ³		No Change (10,000)		No Change (10,000)	

Notes for Table 6:

- "No Change" means no change from the current MCP.
- 1. The new Groundwater UCL for traditional TPH results used as a conservative screening tool is 10 times the highest Method 1 groundwater standard for TPH, per the standard protocol.
- 2. The UCLs for the Hydrocarbon Fractions have been set using the standard protocol, except for the C₉ through C₁₂, C₉ through C₁₈ and C₁₉ through C₃₆ Aliphatic Hydrocarbons soil UCLs, which have been set at 20,000 µg/g, and the C₉-C₁₀ Aromatic Hydrocarbon groundwater UCL which has been set at 100,000 µg/L, all per the May 1996 Discussion Paper.
- 3. The 1994 *Background Documentation for the Development of the MCP Numerical Standards* outlines the standard protocol used to set UCLs. The UCLs are generally a simple 10 fold multiple of the highest exposure-related standard, capped at a maximum concentration of 10,000 µg/gram (or 1%) in soil and 100,000 µg/L (or 0.01 %) in groundwater. Other factors, such as solubility concerns and other risk management considerations may also be considered on a chemical-by-chemical basis.

Changes to MCP Reportable Concentrations - 310 CMR 40.1600								
Oil or Hazardous Material	Old RCGW-1 mg/L	New RCGW-1 mg/L	Old RCGW-2 mg/L	New RCGW-2 mg/L	Old RCS-1 mg/kg	New RCS-1 mg/kg	Old RCS-2 mg/kg	New RCS-2 mg/kg
TOTAL PETROLEUM HYDROCARBON	1	0.4	50	2	No Change (500)	No Change (500)	No Change (2,500)	No Change (2,500)
C ₅ through C ₈ Aliphatic Hydrocarbons	-	0.4	-	1	-	100	-	500
C ₉ through C ₁₂ Aliphatic Hydrocarbons	-	1	-	1	-	1,000	-	2,500
C ₉ through C ₁₈ Aliphatic Hydrocarbons	-	1	-	1	-	1,000	-	2,500
C ₁₉ through C ₃₆ Aliphatic Hydrocarbons	-	5	-	50	-	2,500	-	5,000
C ₉ through C ₁₀ Aromatic Hydrocarbons	-	0.2	-	4	-	100	-	500
C ₁₁ through C ₂₂ Aromatic Hydrocarbons	-	0.2	-	3	-	200	-	2,000
CHANGES BASED ON SOLUBILITY:								
ACENAPHTHENE	No Change (0.02)		2	5	No Change (20)	No Change (20)	2,000	2,500
ACENAPHTHYLENE	No Change (0.3)		2	3	No Change (100)	No Change (100)	800	1,000
ANTHRACENE	0.6	2	0.6	3	No Change (1,000)	No Change (1,000)	1,000	2,500
BENZO[a]ANTHRACENE	No Change (0.001)		0.005	3	No Change (0.7)	No Change (0.7)	No Change (1)	No Change (1)
BENZO[a]PYRENE	No Change (0.0002)		0.002	3	No Change (0.7)	No Change (0.7)	No Change (0.7)	No Change (0.7)
BENZO[b]FLUORANTHENE	No Change (0.001)		0.007	3	No Change (0.7)	No Change (0.7)	No Change (1)	No Change (1)
BENZO[g,h,i]PERYLENE	No Change (0.0005)		0.0005	3	100	1,000	100	2,500
BENZO[k]FLUORANTHENE	No Change (0.001)		0.001	3	No Change (7)	No Change (7)	No Change (10)	No Change (10)
1,1-BIPHENYL	No Change (0.4)		4	50	No Change (1)	No Change (1)	10	100
CHRYSENE	No Change (0.002)		0.003	3	No Change (7)	No Change (7)	No Change (10)	No Change (10)
DIBENZO(a,h)ANTHRACENE	No Change (0.0005)		0.0005	3	No Change (0.7)	No Change (0.7)	No Change (0.7)	No Change (0.7)
3,3'-DICHLOROBENZIDINE	No Change (0.08)		2	50	No Change (1)	No Change (1)	No Change (1)	No Change (1)
DDE	No Change (0.0001)		0.02	0.1	No Change (2)	No Change (2)	No Change (2)	No Change (2)
FLUORANTHENE	0.1	0.2	0.1	0.2	600	1,000	600	1,000
FLUORENE	No Change (0.3)		1	3	No Change (400)	No Change (400)	1,000	2,000
INDENO[1,2,3-cd]PYRENE	No Change (0.0005)		0.0005	3	No Change (0.7)	No Change (0.7)	No Change (1)	No Change (1)
PYRENE	0.08	0.2	0.08	3	500	700	500	2,000

Notes for Table of Reportable Concentrations:

- "No Change" means no change from the current MCP.

The calculation of Reportable Concentrations follows the standard protocol described in Appendix E of *Background Documentation for the Development of the MCP Numerical Standards* (May 1994). Briefly:

- RCGW-1 values are the *lowest* of the Method 1 GW-1, GW-2 and GW-3 standards for a chemical.
- RCGW-2 values are the *lowest* of the Method 1 GW-2 and GW-3 standards for a chemical.
- RCS-1 values are the *lowest* of the Method 1 S-1/GW-1, S-1/GW-2, S-1/GW-3, S-2/GW-1 and S-3/GW-1 standards for a chemical.
- RCS-2 values are the *lowest* of the Method 1 S-2/GW-2, S-2/GW-3, S-3/GW-2 and S-3/GW-3 standards for a chemical.

FOOTNOTE CHANGE:

The current TPH standards listed in Tables 1 through 6 of Subpart I of the Massachusetts Contingency Plan are modified by a footnote. Proposed changes to all such footnotes are as follows:

Total Petroleum Hydrocarbon (TPH) as measured using standard analytical methods ~~or methods which provide toxicity-weighted concentrations, such as the MADEP TPH approach.~~ In lieu of this general TPH standard, parties may use the appropriate combination of Aliphatic and Aromatic Hydrocarbon Fraction standards. The use of the general TPH standard is a valid option only for C₉ and greater petroleum hydrocarbons; it is not appropriate to characterize risks from lighter (gasoline-range) hydrocarbons. Theis general TPH standard and the Fraction-specific standards does not address and are is not sufficient to evaluate specific chemicals which may be present in some petroleum products and which have promulgated MCP standards (such as benzene, toluene, ethylbenzene, xylenes and polycyclic aromatic hydrocarbons (PAHs)).

OTHER REVISIONS TO SUBPARTS I & J

Note to Reviewers: In November 1996, DEP proposed a slight modification of the term "~~building or other permanent structure~~" to emphasize that a building must be a *permanent* building, changing the regulatory term to "permanent buildings and structures." As a result of the nature of their construction, such buildings and structures prevent exposure to oil or hazardous material for long periods of time, although that is not their primary function (e.g. a municipal building or a transformer station which happens to be located over contaminated soil.) Comments were received indicating that DEP should better define the term "permanent building or structure". By indicating that a "permanent building or structure" sits upon a foundation and was built conforming to applicable building codes, DEP seeks to differentiate such permanent edifices from ephemeral structures and barriers. Comment is sought on this definition and alternative descriptions are encouraged. DEP also seeks comment on whether "permanent buildings and structures" do, in fact, provide adequate long-term protection. Redevelopment -- including Brownfields development -- constantly takes place, resulting in the demolition, reconstruction and site disturbance.

40.0933 Identification of Applicable Soil Categories

(4) For the purpose of soil categorization, the potential for exposure is described by a qualitative analysis of the accessibility of the soil in combination with the information about the Site Activities and Uses determined pursuant to 310 CMR 40.0923. The following definitions shall be used to describe exposure potential for the purposes of categorizing soil: ...

(c) Accessibility of the soil to potential receptors shall be characterized as either "accessible," "potentially accessible," or "isolated" using the following criteria:

1. Soil shall be characterized as "accessible" if it is located less than three feet below the surface, and the surface is not completely covered by pavement. For buildings having earthen floors, the floor shall be considered as the soil surface.
2. Soil shall be characterized as "potentially accessible" if it is located at a depth of three - 15 feet below the surface (with or without pavement), or if the soil is located less than three feet from the surface in an area completely paved.
3. Soil shall be characterized as "isolated" if it is located at a depth greater than 15 feet below the surface, or if the soil is covered completely by a ~~building or other permanent structure~~ permanent building or structure which does not have earthen floors, regardless of depth. Soil located at a depth greater than three feet below the earthen floor of a ~~building or other permanent structure~~ permanent building or structure shall also be characterized as "isolated."

a. For the purpose of soil characterization, a "permanent building or structure" is a building or structure which is constructed on a foundation and in compliance with applicable building codes.

b. Indoor air contamination resulting from oil or hazardous material in soil located beneath a permanent building or structure may prohibit the use of Method 1 to characterize risk, pursuant to 310 CMR 40.0942(1)(b).

Note to Reviewers: The following addition to the applicability of Method 1 is made to emphasize that the presence of oil or hazardous material in indoor air may pose a risk of harm to health and/or public welfare which has not been addressed in the Method 1 standards. Of particular concern are the proposed GW-1 and soil standards for the various petroleum fractions, some of which may be high enough to result in noticeable odor or taste impacts. Since there is limited data on the odor thresholds of these fractions, DEP limited the allowable concentrations in only one instance: the GW-1 standard for the C₁₉ - C₃₆ Aliphatic Hydrocarbons. Rather than lower the Method 1 standards in all instances, however, DEP proposes to rely upon the Method 1 applicability regulations to rule out sites at which these standards are not sufficiently protective for organoleptic impacts. Thus this change does not represent a new requirement, rather the application of the general rule [310 CMR 40.0971 and 310 CMR 40.0942(1)] to a specific circumstance.

40.0971 Applicability of Method 1.

- (2) If contamination is present in one or more environmental media other than soil or groundwater, Method 1 shall not be used, except as described in 310 CMR 40.0942(1)(b). Persistent odor resulting from oil or hazardous material in soil, groundwater or drinking water shall be considered one indication of air contamination which may prohibit the use of Method 1.

Note to Reviewers: The following deletion removes consideration of solubility from the development of Method 2 groundwater standards, just as DEP is proposing to eliminate consideration of solubility from development of the Method 1 standards, as discussed above.

40.0983: Derivation of Additional Method 1 Groundwater Standards for Use in Method 2.

- ~~(6) Any of the MCP Method 2 groundwater standards calculated in 40.0983(2) through (5) shall be adjusted to be equal to 1/2 of the solubility (in µg/liter at 25° C) in water of the oil and/or hazardous material if the calculated value is greater than the solubility of that chemical.~~

Changes to the UCL/Response Action Outcome Requirements

(SUBPART D)

Note to Reviewers: changes and options to modify the use of Upper Concentration Limits (UCLs) to characterize risk (and thus determine the Response Action Outcome (RAO) category) were proposed in the November 1, 1996 public hearing draft. Based on comment received on those proposals, DEP is considering changes that would allow the achievement of a Class A or B Response Action Outcome where the contaminant levels in soil exceed the UCLs in cases:

- where the contamination is located greater than 15 ft below the ground surface; or
- where an "engineered barrier" (designed and maintained to prevent contact with/exposure to contaminants) was installed to cap soil with levels above the UCLs.

The following revisions, which include a proposed definition of engineered barrier, are intended to implement these changes.

40.0996: Method 3 Upper Concentration Limits

(1) Upper Concentration Limits in soil and groundwater are concentrations of oil and/or hazardous material which, if exceeded under the conditions specified below, indicate the potential for significant risk of harm to public welfare and the environment under future conditions. If a condition of No Significant Risk has not been achieved for future conditions but all substantial hazards have been eliminated, then the site may be eligible for a Class C RAO described in 310 CMR 40.1050.

Note to Reviewers: the addition of section (2) is intended to clarify the application of UCLs, specifically to reinforce the current regulation/policy that UCLs are to be compared separately to both the average site concentrations and the average concentration within any Hot Spot. This change does not modify the current approach.

~~(2) All comparisons of soil and groundwater concentrations to Upper Concentration Limits in Soil and Groundwater required under 310 CMR 40.0000 shall be made using both:~~

~~(a) the arithmetic average of the concentration of oil or hazardous material at a disposal site; and~~

~~(b) the arithmetic average of the concentration of oil or hazardous material within any Hot Spot identified at the disposal site.~~

~~(2) The risk of harm to public welfare and the environment shall also be characterized by comparing the arithmetic mean of the concentration(s) of the chemical oil or hazardous material in soil and groundwater to the Upper Concentration Limits in Soil and Groundwater listed in 310 CMR 40.0996(5 c). If one or more hot spots have been identified at the site pursuant to 310 CMR 40.0924(2), then the concentrations within each hot spot shall also be compared to the Upper Concentration Limits.~~

~~(a) A level of No Significant Risk of harm to public welfare and to the environment exists or has been achieved for both current and future conditions if no concentration of oil and/or hazardous material exceeds an applicable Upper Concentration Limit.~~

~~(b) A level of No Significant Risk of harm to public welfare and to the environment exists or has been achieved for current conditions, but does not yet exist for future conditions if the concentration of one or more oil and/or hazardous materials exceed an applicable Upper Concentration Limit. The disposal site may, however, meet the conditions of a Class C Response Action Outcome if all other requirements for a Class C Response Action Outcome are satisfied.~~

(3.4) Upper Concentration Limits are not applicable to soil.

(a) which has been permanently immobilized or fixated as part of a ~~remedial~~ response action; or

(b) which is located at a depth greater than fifteen feet from the ground surface or beneath an engineered barrier as that term is defined in 310 CMR 40.0996(4)(c).

1. except to determine the need for an Activity and Use Limitation, as described at 310 CMR 40.1012(2)(a)3;

2. except to determine the content of a Response Action Outcome Statement, as described at 310 CMR 40.1056(1)(i); and

3. unless a feasibility analysis conducted pursuant to the criteria listed at 310 CMR 40.0860 demonstrates that reducing the concentrations of oil and hazardous material to levels less than or equal to the Upper Concentration Limits is feasible.

(c) "engineered barrier" means a cap that is designed, installed and maintained in accordance with scientific and engineering standards of professionals conducting response actions to achieve a level of no significant risk for any foreseeable period of time by:

1. preventing direct contact with contaminated media;

2. controlling any vapors or dust emanating from capped media;

3. preventing infiltration of precipitation; and

4. isolating the contaminated media from the environment.

(4.5) The presence of non-aqueous phase liquids (NAPL) having a thickness equal to or greater than ½ inch in any environmental medium shall be considered a level which exceeds Upper Concentration Limits.

(5.5) Table 6 lists the Upper Concentration Limits in Groundwater and Soil.

(SUBPART J)

40.1005: Defining "Foreseeable Period of Time" for Purposes of a Response Action Outcome

(2) "Any foreseeable period of time" shall mean the period of time during which the conditions for achieving and maintaining a level of No Significant Risk upon which a Class A or Class B RAO is based will remain in effect. Any foreseeable period of time:

(a) for Class A-1, A-2 or B-1 RAOs shall be an unlimited period of time;

(b) for Class B-2 and B-3 RAOs shall be that period of time that Activity and Use Limitations will remain in effect; and

(c) for Class A-3 and A-4 RAOs shall be that period of time that Activity and Use Limitations will remain in effect or the design life of any remedial systems necessary to maintain a condition of No Significant Risk, whichever is shorter.

40.1012: Application of Activity and Use Limitations

(1) The purpose of an Activity and Use Limitation is to narrow the scope of exposure assumptions used to characterize risks to human health from a release pursuant to 310 CMR 40.0900, by specifying activities and uses that ~~will be~~ are prohibited and allowed at the disposal site in the future. This section establishes rules for determining when an Activity and Use Limitation must be used, when one cannot be used, and when one may be a factor to be considered in appropriately characterizing soil and groundwater at a disposal site, pursuant to 310 CMR 40.0923(3).

- (2) Except as provided in 310 CMR 40.1012(3), Activity and Use Limitations shall be required:
- (a) at all disposal sites or portions of disposal sites for which a Response Action Outcome and the risk characterization pursuant to 310 CMR 40.0900 used to support the RAO are based upon the restriction or limitation of Site Activities and Uses to achieve or maintain a level of No Significant Risk including:
 - 1. any disposal site or portion of a disposal site for which a Response Action Outcome is based on MCP Method 1 or 2 Soil Standards and the Exposure Point Concentrations of oil and/or hazardous material exceed the S-1 standards but meet applicable S-2 or S-3 standards; and
 - 2. any disposal site or portion of a disposal site where a Method 3 Risk Characterization performed pursuant to 310 CMR 40.0990 relies on reduced exposure potential due to the assumption of limited site use;
 - 3. any disposal site or portion of a disposal site at which the concentration of an oil and/or hazardous material in soil located at a depth greater than fifteen feet from the ground surface exceeds an applicable Upper Concentration Limit in Soil listed at 310 CMR 40.0996(6);
 - (b) at all disposal sites for which a Response Action Outcome relies upon Exposure Pathway elimination measures to prevent exposure to levels of oil and/or hazardous material that would otherwise pose a significant risk of harm to health, safety, public welfare or the environment; and
 - (c) at all sites where an existing private well(s) has been abandoned and the property(ies) served by the private water supply has been connected to a public water supply system in accordance with the provisions of 310 CMR 40.0932(5)(d).

Note to Reviewers: contamination less than UCLs and located at depths greater than 15 feet from the ground surface had been previously exempted from the AUL requirement. This exemption does not change in this proposal. What is added is language requiring AULs for contamination at levels greater than UCLs.

- (3) Activity and Use Limitations shall not be required but may be used to provide notice of the existence of residual contamination to future holders of an interest(s) in property that is located within:
- (a) disposal sites or portions of disposal sites where the concentrations of oil and/or hazardous material have been reduced to background or where the requirements described in 310 CMR 40.0923(3)(b) have been met;
 - (b) disposal sites or portions of disposal sites ~~whereat~~ at which residual contamination is located at a depth greater than 15 feet from the ground surface and where the concentrations of oil and/or hazardous material in such soil do not exceed applicable Upper Concentration Limits in Soil listed at 310 CMR 40.0996(6);
 - (c) any portion of a disposal site where residual contamination is located within a public way or within a rail right-of-way;
 - (d) disposal sites or portions of a disposal site for which potential risks are characterized using Method 1 (310 CMR 40.0970) if the levels of oil and/or hazardous material in soil are at or below the applicable Method 1 category S-1 soil standards listed in 310 CMR 40.0975(6);
 - (e) at disposal sites or portions of a disposal site for which potential risks are characterized using Method 2 (310 CMR 40.0980) if the levels of oil and/or hazardous material are at or below the applicable category S-1 soil standards identified in 310 CMR 40.0984 and 40.0985;
 - (f) disposal sites or portions of a disposal site for which potential risks are characterized using Method 3 (310 CMR 40.0990) if the levels of oil and/or hazardous material pose No Significant Risk pursuant to 310 CMR 40.0990, including comparison to any applicable or suitably analogous standards, and no limitations on site use were assumed or implied in the Risk Characterization;
 - (g) any disposal site or portion of a disposal site where all substantial hazards have been eliminated and where all applicable requirements for a Class C Response Action Outcome have been met pursuant to 310 CMR 40.1050; and
 - (h) any other disposal site or portion of a disposal site where an Activity and Use Limitation is not expressly prohibited by 310 CMR 40.1012.

Note to Reviewers: (4) clarifies that applicable Method 1 (or 2) standards must be met in order to achieve an RAO using Method 1 (or 2). If a Method 1 (or 2) standard is exceeded when you are using Method 1 (or 2) to characterize a site, then two options are available: conclude that a level of No Significant Risk has not been achieved and remediate, or re-evaluate the site using a more site-specific Method (2 or 3). ~~An AUL cannot change or modify a conclusion; it merely "locks in" the exposure assumptions which result in that conclusion.~~

~~(4) Activity and Use Limitations shall not be used:~~

~~(a) to change the groundwater category of groundwater categorized as GW-1 or GW-2 pursuant to 310 CMR 40.0932; or~~

~~(b) to justify a conclusion that a condition of No Significant Risk exists or has been achieved at sites characterized using Method 1 or Method 2 if an identified Exposure Point Concentration exceeds an applicable Method 1 or Method 2 standard.~~

~~Where groundwater meets the criteria established in 310 CMR 40.0932 for GW-1 or GW-2, an Activity and Use Limitation shall not be used to change the category.~~

(5) Activity and Use Limitations:

(a) shall provide notice to holders of any interest(s) in a property or a portion thereof (including without limitation, owners, lessees, tenants, mortgagees, and holders of easement rights) of the existence and location of oil and/or hazardous material at such property and the Activity and Use Limitations that have been implemented in response thereto; and

(b) establish a duty to evaluate risks associated with proposed changes in Site Activities and Uses on the subject property that could increase the risk of harm to health, safety, public welfare or the environment and to perform additional response actions prior to any such change in Site Activities and Uses, as required by 310 CMR 40.0000.

(6) Any Activity and Use Limitations applied at a disposal site pursuant to 310 CMR 40.0000 shall be instituted and maintained in accordance with 310 CMR 40.1070 through 310 CMR 40.1099.

Note to Reviewers: the following changes add the RAO Class A-4 and B-3 categories for sites with residual contamination in soil greater than UCLs at depths greater than 15 feet or beneath "engineered barriers".

40.1030: Categories of Response Action Outcomes

(1) Response Action Outcomes are categorized under 310 CMR 40.1030 through 40.1050 as A-1, A-2, A-3, A-4, B-1, B-2, B-3, or C.

(2) The specific category of Response Action Outcome applicable to a site or disposal site shall be established based upon the following factors:

(a) whether the site or disposal site poses No Significant Risk;

(b) whether all substantial hazards posed by the disposal site have been eliminated;

(c) whether remedial actions have been taken to achieve a level of No Significant Risk;

(d) whether one or more Activity and Use Limitations are required under the provisions of 310 CMR 40.1012 to maintain a level of No Significant Risk;

~~(e) whether concentrations of oil and/or hazardous material at a site exceed Upper Concentration Limits in Soil and Groundwater listed at 310 CMR 40.0996(f); and~~

(e) whether remedial actions have achieved background, as described in 310 CMR 40.0900 and 310 CMR 40.1020.

40.1036: Categories of Class A Response Action Outcomes

- (1) Class A-1 Response Action Outcomes shall apply to:
 - (a) disposal sites where a Permanent Solution has been achieved and the level of oil and hazardous material in the environment has been reduced to background; or
 - (b) sites where response actions have eliminated all threats of release and no release of oil and/or hazardous material to the environment has occurred.
- (2) Class A-2 Response Action Outcomes shall apply to disposal sites where:
 - (a) a Permanent Solution has been achieved;
 - (b) the level of oil and hazardous material in the environment has not been reduced to background; and
 - (c) one or more Activity and Use Limitations are not required to maintain a level of No Significant Risk.
- (3) Class A-3 Response Action Outcomes shall apply to disposal sites where:
 - (a) a Permanent Solution has been achieved;
 - (b) the level of oil and hazardous material in the environment has not been reduced to background; and
 - (c) one or more Activity and Use Limitations have been implemented pursuant to 310 CMR 40.1012 to maintain a level of No Significant Risk; and
 - (d) no concentration of oil or hazardous material at the disposal site exceeds an applicable Upper Concentration Limit in Soil or Groundwater listed at 310 CMR 40.0996(6).
- ~~(4) Class A-4 Response Action Outcomes shall apply to disposal sites where:~~
 - ~~(a) a Permanent Solution has been achieved;~~
 - ~~(b) the level of oil and hazardous material in the environment has not been reduced to background;~~
 - ~~(c) one or more Activity and Use Limitations have been implemented pursuant to 310 CMR 40.1012 to maintain a level of No Significant Risk;~~
 - ~~(d) one or more concentrations of oil and/or hazardous material in soil located at a depth greater than fifteen feet from the ground surface or beneath an engineered barrier exceed applicable Upper Concentration Limits in Soil listed at 310 CMR 40.0996(6); and~~
 - ~~(e) an evaluation conducted pursuant to 310 CMR 40.0860 indicates that it is not feasible to reduce the concentrations of oil and hazardous material in soil located at a depth greater than fifteen feet from the ground surface or in the area beneath the engineered barrier to less than applicable Upper Concentration Limits in Soil listed at 310 CMR 40.0996(6).~~
- ~~(4.5)~~ A Class A-1, A-2, ~~A-3, or A-4~~ ~~or A-3~~ Response Action Outcome shall not apply to any disposal site where:
 - (a) groundwater or soil concentrations of oil and/or hazardous material exceed Upper Concentration Limits specified in 310 CMR 40.0996, except in those cases where the concentrations are shown to be consistent with background, or the soil is located at a depth greater than fifteen feet from the ground surface or beneath an engineered barrier and it is not feasible pursuant to the criteria listed at 310 CMR 40.0860 to reduce such soil concentrations; or
 - (b) groundwater concentrations exceed an applicable or suitably analogous standard listed in 310 CMR 40.0993(3) where the groundwater is categorized as GW-1 pursuant to 310 CMR 40.0932.

- (5) Class A-1, A-2, ~~A-3 and A-4~~ and A-3 Response Action Outcomes may be achieved:
- (a) after completion of Immediate Response Actions and/or Release Abatement Measures pursuant to 310 40.0400;
 - (b) after completion of a Phase IV remedial action pursuant to 310 CMR 40.0870;
 - (c) after completion of Phase V operation, maintenance and/or monitoring pursuant to 310 CMR 40.0890; or
 - (d) after completion of Post-RAO operation, maintenance and/or monitoring pursuant to 310 CMR 40.0896.

40.1046: Categories of Class B Response Action Outcomes

(1) Class B-1 Response Action Outcomes shall apply to disposal sites where remedial actions have not been conducted because a level of No Significant Risk exists and no Activity and Use Limitation is necessary to ensure the existence or maintenance of a level of No Significant Risk.

(2) Class B-2 Response Action Outcomes shall apply to disposal sites where:

~~(a) remedial actions have not been conducted because a level No Significant Risk exists, but such a level of No Significant Risk is contingent upon one or more Activity and Use Limitations that have been implemented at the disposal site pursuant to 310 CMR 40.1012 to restrict exposures to oil and/or hazardous material; and~~

~~(b) no concentration of oil or hazardous material at the disposal site exceeds an applicable Upper Concentration Limit in Soil or Groundwater listed at 310 CMR 40.0996(6).~~

~~(3) Class B-3 Response Action Outcomes shall apply to disposal sites where:~~

~~(a) remedial actions have not been conducted because a level No Significant Risk exists, but such a level of No Significant Risk is contingent upon one or more Activity and Use Limitations that have been implemented at the disposal site pursuant to 310 CMR 40.1012 to restrict exposures to oil and/or hazardous material; and~~

~~(b) one or more concentrations of oil and/or hazardous material in soil located at a depth greater than fifteen feet from the ground surface or beneath an engineered barrier exceed applicable Upper Concentration Limits in Soil listed at 310 CMR 40.0996(6); and~~

~~(c) an evaluation conducted pursuant to 310 CMR 40.0860 indicates that it is not feasible to reduce the concentrations of oil and hazardous material in soil located at a depth greater than fifteen feet from the ground surface or in the area beneath an engineered barrier to less than applicable Upper Concentration Limits in Soil listed at 310 CMR 40.0996(6).~~

(34) For the purposes of 310 CMR 40.1000 only, the filing or recording and/or registration of one or more Activity and Use Limitations shall not be deemed a remedial action.

(45) A Class B-1, B-2 or B-3 ~~or B-2~~ Response Action Outcome shall not apply to any disposal site where:

(a) groundwater or soil concentrations of oil and/or hazardous material exceed Upper Concentration Limits specified in 310 CMR 40.0996, except in those cases where the concentrations are shown to be consistent with background or where the soil is located at a depth greater than fifteen feet from the ground surface or beneath an engineered barrier and it is not feasible pursuant to the criteria listed at 310 CMR 40.0860 to reduce such soil concentrations; or

(b) groundwater concentrations exceed an applicable or suitably analogous standard listed in 310 CMR 40.0993(3) where the groundwater is categorized as GW-1 pursuant to 310 CMR 40.0932.

(5) Class B Response Action Outcomes may be achieved:

- (a) after completion of Initial Assessment Activities pursuant to 310 CMR 40.0405(1);
- (b) after completion of a Phase I Initial Site Investigation Report pursuant to 310 40.0480; or
- (c) after completion of a Phase II Comprehensive Site Assessment pursuant to 310 40.0830;

40.1050: Class C Response Action Outcomes: Temporary Solutions

- (1) Class C Response Action Outcomes shall apply to disposal sites where a Temporary Solution has been achieved. A Temporary Solution shall ensure the elimination of any substantial hazard at the disposal site.
- (2) Class C Response Action Outcomes shall apply, without limitation, to the following types of disposal sites:
 - (a) disposal sites where Upper Concentration Limits ~~as applicable pursuant to specified in~~ 310 CMR 40.0996 are exceeded in soil and/or groundwater, but all substantial hazards have been eliminated; and/or
 - (b) disposal sites where oil and/or hazardous material concentrations exceed any applicable or suitably analogous standard identified pursuant to 310 CMR 40.0993(3), but such concentrations of oil and/or hazardous material do not pose a substantial hazard.

Note to Reviewers: the following change requires that the RAO Statement explicitly note that residual contamination exceeds UCLs. DEP envisions the addition of a "Greater Than UCL" check-off box on the RAO form.

40.1056: Content of Response Action Outcome Statements

- (1) A Response Action Outcome Statement shall be submitted by a RP, PRP or Other Person on a form established by the Department for such purposes, and shall include, at a minimum, the following:
 - (a) the site or disposal site name, address and DEP Release Tracking Number(s);
 - (b) the class of Response Action Outcome;
 - (c) for all RAOs other than RAOs where the concentrations of oil and hazardous material are consistent with or have been reduced to background or where a threat of release has been abated, the Method(s) (Methods 1, 2 or 3) used to characterize the risk of harm posed by the disposal site to health, public welfare and the environment, pursuant to 310 CMR 40.0900;
 - (d) the relationship of the Response Action Outcome Statement to any other Response Action Outcome Statements that have been filed for the disposal site, if applicable, together with a statement as to whether any additional response actions are needed for any other portions of the disposal site;
 - (e) where the RAO Statement applies to a Class C RAO, indication as to whether any Post-RAO Active Operation and Maintenance of the remedial action under 310 CMR 40.0896 will be conducted;
 - (f) indication as to whether the RAO is based upon the implementation of an Activity and Use Limitation, and if so, the type of Activity and Use Limitation implemented at the disposal site. In such cases, a Activity and Use Limitation Opinion accompanied by an Activity and Use Limitation Opinion form prescribed by the Department shall be appended to the RAO Statement pursuant to 310 CMR 40.1056(2)(g);
 - (g) except where specifically exempted by the Department based upon the Department's level of involvement in the oversight of response actions at the site or disposal site, an Opinion from a Licensed Site Professional as to whether the requirements of the applicable class of Response Action Outcome specified in 310 CMR 40.1000 have been met; and
 - (h) a certification of the Response Action Outcome Statement and all documents submitted with the RAO Statement as required by 310 CMR 40.0009.
 - (i) indication as to whether residual concentrations of oil and/or hazardous material exceed Upper Concentration Limits in Soil or Groundwater, as described at 310 CMR 40.0996.
- (2) Except where previously submitted, all documentation, plans and/or reports necessary to support the Response Action Outcome shall be submitted to the Department, including, without limitation, the following:
 - (a) as specified in 310 CMR 40.1003(4), a clear and accurate description of the location of the site or the location and boundaries of the disposal site or portion of disposal site to which the RAO applies. Such description shall reference, to the extent practicable, the location of the site, and location and

boundaries of the disposal site or portion thereof relative to permanent or semi-permanent landmarks, and/or surveyed boundaries;

(b) for all Class A Response Action Outcomes and where applicable to Class C Response Action Outcomes, a demonstration that all uncontrolled sources, as specified in 310 CMR 40.1003(5) have been eliminated or controlled;

(c) for all Class A and B Response Action Outcomes, information supporting the conclusion that a level of No Significant Risk has been achieved or exists;

(d) for all Class C Response Action Outcomes, information supporting the conclusion that no substantial hazards remain at the disposal site;

(e) for all Class A Response Action Outcomes, information documenting the extent to which levels of oil and/or hazardous material in the environment have been reduced to background, and for all Class A-2 and A-3 RAOs, the results of the feasibility evaluation conducted pursuant to 310 CMR 40.0860 demonstrating that the achievement of background is not feasible;

~~(f) for all Class A-4 and B-3 Response Action Outcomes, the results of the feasibility evaluation conducted pursuant to 310 CMR 40.0860 demonstrating that the achievement of Upper Concentration Limits in soil located at a depth greater than fifteen feet from the ground surface or in the area beneath an engineered barrier is not feasible;~~

~~(f)~~ a ~~certified registry~~ copy of any and all Activity and Use Limitations which have been implemented under 310 CMR 40.1070;

~~(g)~~ where the RAO is based upon the implementation of an Activity and Use Limitation, an Activity and Use Limitation Opinion ~~accompanied by an Activity and Use Limitation Opinion form prescribed by the Department~~ as specified in 310 CMR 40.1071 or 310 CMR 40.1074, whichever is applicable;

~~(h)~~ a description of any operation, maintenance, and/or monitoring that will be required to confirm and/or maintain those conditions at the disposal site upon which the RAO is based; and

~~(i)~~ for all Class C Response Action Outcomes, a copy of the plan, as specified in 310 CMR 40.0861(2)(h), which presents definitive and enterprising steps to be taken toward achieving a Permanent Solution at the disposal site.

Note to Reviewers: The proposed revision to 40.1101 is being added in response to comments received which suggest that DEP should make explicit in the MCP its practice and policy of auditing response actions and response action submittals on the basis of the promulgated standards and professional standards of practice that exist at the time the response action is being performed or the submittal was received by the Department.

SUBPART K: AUDITS AND COMPLIANCE ASSISTANCE

40.1101: Purpose, Scope and Applicability

(1) The regulations published at 310 CMR 40.1101 through 310 CMR 40.1199, collectively referred to as 310 CMR 40.1100, establish procedures for the Department to audit a sufficient number of response actions not overseen or conducted by the Department to ensure that those response actions are performed in compliance with M.G.L. c. 21E, 310 CMR 40.0000, 310 CMR 40.000 and any other requirement applicable to such response actions. As part of the audit process the Department will conduct compliance assistance to furnish advice and guidance to persons undertaking response actions as to the Department's interpretation of, and the proper application of, M.G.L. c. 21E, 310 CMR 40.0000, 310 CMR 40.000 and other requirements as a means of assisting such persons in confirming, demonstrating or achieving compliance with such requirements.

(2) During each fiscal year, the Department shall audit at least twenty percent of all sites for which annual compliance assurance fees are required to be paid pursuant to M.G.L. c. 21E, § 3B. The Department may establish additional audit targets for categories of persons, response actions or sites based on the level of Department oversight provided to each category.

(3) The Department shall audit response actions and response action submittals on the basis of the standard of care in effect at the time of the action or receipt of the submittal.

SPREADSHEETS

FOR THE

DEVELOPMENT OF THE

VPH/EPH STANDARDS

(These pages are not part of the formal regulations package,
but are being made available as background information
relevant to the standards proposed.)

TOXICITY INFORMATION

OIL OR HAZARDOUS MATERIAL	CHRONIC ORAL		SUBCHRONIC		CHRONIC	
	REFERENCE	DOSE (OR	REFERENCE	DOSE (OR	INHALATION	REFERENCE
	SUBSTITUTE)	SUBSTITUTE)	SUBSTITUTE)	SUBSTITUTE)	CONCENTRATION	(OR SUBSTITUTE)
	mg/kg/day	REF	mg/kg/day	REF	ug/cu m	REF
TOTAL PETROLEUM HYDROCARBONS	3.0E-02		3.0E-01			
Aliphatics						1
C5 to C8	6.0E-02		0.6		2.0E+02	
C9 to C12	6.0E-01		6		2.0E+03	10*n-hexane
C9 to C18	6.0E-01		6		2.0E+03	10*n-hexane
C19 to C35	6.0E+00		60			
Aromatics						
C9 to C10	3.0E-02		0.3		6.0E+01	Xylenes (C8)
C11 to C22	3.0E-02		0.3		7.1E+01	naphthalene

tox

TOXICITY INFORMATION

OIL OR HAZARDOUS MATERIAL	INDOOR										WATER	
	RAF_Ch RAF_Ch RAF_Sub RAF_Sub RAF_Ch					AIR BACK- GROUND (VAPORS)					HENRY'S	
	SOIL	SOIL	SOIL	SOIL	WATER	CH	WATER	WATER	INGEST	ug/cu m	LAW	ODOR
	INGEST	ERMA	INGEST	DERMAL	INGEST		INGEST				CONSTANT	THRESHOLD REF
										atm-m3/mol	conc/conc	REF
										REF		μg/L
TOTAL PETROLEUM HYDROCARBONS	1	1	1	1	1	1	1	1	1			
Aliphatics												
C5 to C8	0.91	0.5	0.91	0.5	1	1	1	1	1	102	5.4E+01	5000
C9 to C12	0.91	0.2	0.91	0.2	1	1	1	1	1	70	6.5E+01	5000
C9 to C18	0.91	0.2	0.91	0.2	1	1	1	1	1	74	6.9E+01	5000
C19 to C35	0.91	0.1	0.91	0.1	1	1	1	1	1			5000
Aromatics												
C9 to C10	0.91	0.18	0.91	0.18	0.91	0.91	0.91	0.91	0.91	0.00792	3.3E-01	5000
C11 to C22	0.91	0.18	0.91	0.18	0.91	0.91	0.91	0.91	0.91	0.00072	3.0E-02	5000

TOXICITY INFORMATION

OIL OR HAZARDOUS MATERIAL	VAPOR		Koc	REF	CEILING		CEILING		CEILING		CEILING
	PRESSURE	Torr			S1	Ceiling	S2	Ceiling	S3	Ceiling	
20-30 C	ml/g										
TOTAL PETROLEUM HYDROCARBONS											
Aliphatics											
C5 to C8	7.6E+01	2265	3.8E+04	13	1000	Non-Odor	2500	Non-Odo	5000	Non-Odor	50000
C9 to C12	6.6E-01	150000			100	Prof Jug	500	Prof Jug	500	Prof Jug	50000
C9 to C18	1.1E-01	680000			1000	Prof Jug	2500	Prof Jug	5000	Prof Jug	50000
C19 to C35					2500	Prof Jug	5000	Prof Jug	5000	Prof Jug	50000
Aromatics											
C9 to C10	2.2E+00	1778			100	Prof Jug	500	Prof Jug	500	Prof Jug	50000
C11 to C22	2.4E-02	5012			1000	Prof Jug	2500	Prof Jug	5000	Prof Jug	50000

SOIL CATEGORY S-1
DIRECT CONTACT LEVELS
(METHOD 2)

RISK-BASED
 NONCANCER
 H.I. =
 0.2

HIGHEST
 RISK, PQL &
 BCKGRND

LOWEST
 CEILING,
 (RISK,PQL,
 BCKGRND)

S-1, METHOD 2
 DIRECT CONTACT
 STANDARD

OIL OR HAZARDOUS MATERIAL

mg/kg

mg/kg

mg/kg

mg/kg

mg/kg

Basis

TOTAL PETROLEUM HYDROCARBONS					
Aliphatics	C5 to C8	7.3E+02	7.3E+02	100	100 Ceiling
	C9 to C12	1.5E+04	1.5E+04	1000	1000 Ceiling
	C9-C18	1.5E+04	1.5E+04	1000	1000 Ceiling
	C19 to C32	2.3E+05	2.3E+05	2500	2500 Ceiling
Aromatics	C9 to C10	8.1E+02	8.1E+02	100	100 Ceiling
	C11 to C22	8.1E+02	8.1E+02	809	800 Noncancer Risk

SOIL CATEGORY S-2
DIRECT CONTACT LEVELS
(METHOD 2)

RISK-BASED
NONCANCER
H.I. =
0.2

HIGHEST
RISK, POL &
BCKGRND
mg/kg

LOWEST
CEILING,
(RISK,POL,
BCKGRND)
mg/kg

S-2, METHOD 2
DIRECT CONTACT
STANDARD
mg/kg

OIL OR HAZARDOUS MATERIAL		mg/kg	mg/kg	mg/kg	Basis
TOTAL PETROLEUM HYDROCARBONS					
Aliphatics	C5 to C8	1.5E+03	1.5E+03	500	500 Ceiling
	C9 to C12	3.6E+04	3.6E+04	2500	2500 Ceiling
	C9 to C18	3.6E+04	3.6E+04	2500	2500 Ceiling
	C19 to C32	6.7E+05	6.7E+05	5000	5000 Ceiling
Aromatics	C9 to C10	2.0E+03	2.0E+03	500	500 Ceiling
	C11 to C22	2.0E+03	2.0E+03	2000	2000 Noncancer Risk

SOIL CATEGORY S-3
DIRECT CONTACT LEVELS
(METHOD 2)

OIL OR HAZARDOUS MATERIAL	RISK-BASED		HIGHEST		LOWEST		S-2 STANDAR		HIGHEST		S-3, METHOD 2	
	NONCANCER	RISK, POL &	RISK, POL	CEILING,	FROM S-2	CEILING,	SPREADSHEET	FROM S-2	CALCULATED	DIRECT CONTACT	STANDARD	DIRECT CONTACT
	H.I. =	BCKGRND	BCKGRND	(RISK,POL, SPREADSHEET	S-3 OR S-2	STANDARD						
	0.2	BCKGRND)	(RAW)									
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	Basis
TOTAL PETROLEUM HYDROCARBONS												
Aliphatics												
C5 to C8	7.1E+03	7.1E+03	500.00	500	500	500	500	500	500	500	500	from S-2
C9 to C12	1.7E+05	1.7E+05	5000.00	2500	2500	2500	2500	2500	5000	5000	5000	Ceiling
C9 to C18	1.7E+05	1.7E+05	5000.00	2500	2500	2500	2500	2500	5000	5000	5000	Ceiling
C19 to C32	3.1E+06	3.1E+06	5000.00	5000	5000	5000	5000	5000	5000	5000	5000	from S-2
Aromatics												
C9 to C10	9.3E+03	9.3E+03	500.00	500	500	500	500	500	500	500	500	from S-2
C11 to C22	9.3E+03	9.3E+03	5000.00	2000	2000	2000	2000	2000	5000	5000	5000	Ceiling

**GROUNDWATER
CATEGORY GW-1**

OIL OR HAZARDOUS MATERIAL	Existing Standard µg/L	LOWEST				HIGHEST:		LOWEST:		GW-1		PROPOSED STANDARD (Rounded) µg/L	BASIS
		Non- Cancer µg/L	Risk- Based µg/L	Risk/ Odor Based µg/L	Risk/ Odor Based µg/L	Risk/Odor, Bckgrnd, PQL µg/L	GW-1 INT, Ceiling, 1/2 Sol. µg/L	PROPOSED STANDARD (raw value) µg/L					
									PROPOSED				

TOTAL PETROLEUM HYDROCARBONS Aliphatics	C5 to C8	420	420	420	420	420	420	420	420	400	Threshold
	C9 to C12	4200	4200	4200	4200	4200	4200	4200	4200	4000	Threshold
	C9 to C18	4200	4200	4200	4200	4200	4200	4200	4200	4000	Threshold
	C19 to C32	42000	42000	5000	5000	5000	5000	5000	5000	5000	ODOR
Aromatics	C9 to C10	230.8	231	231	231	231	231	231	231	200	Threshold
	C11 to C22	230.8	231	231	231	231	231	231	231	200	Threshold

GW-2 STANDARDS

OIL OR HAZARDOUS MATERIAL	HIGHER				GW-2 INT				GROUNDWATER	
	20% RfC		LOWEST Bckgrnd, (risk, odor)		Volatility Based Value		Highest Value		GW-2	
	ug/m3	ug/m3	ug/m3	ug/m3	Factor (alpha)	Dilution (d)	Source Factor	Units Con- version	Vol Value Bckgrnd	PROPOSED STANDARD (Rounded)
								l/cu m	$\mu\text{g/L}$	$\mu\text{g/L}$
TOTAL PETROLEUM HYDROCARBONS										
Aliphatics										
C5 to C8	#####	40.0	102	5E-04	0.01	0.01		1000	378	377.78
C9 to C12	#####	400.0	400	5E-04	0.01	0.01		1000	1231	1230.77
C9 to C18	#####	400.0	400	5E-04	0.01	0.01		1000	1159	1159.42
C19 to C32				5E-04	0.01	0.01		1000		
Aromatics										
C9 to C10	#####	12.0	12	5E-04	0.01	0.01		1000	7273	7272.73
C11 to C22	#####	14.2	14.2	5E-04	0.01	0.01		1000	94667	50000.00
										5000 SEE ISSUES PAPER
										### Ceiling

OIL OR HAZARDOUS MATERIAL	Lowest Ambient Water Quality Criteria	μg/L	BASIS	GROUNDWATER				ROUNDWATER	
				AWQC	"GW-3 INT	LOWEST	GROUNDWATER	ROUNDWATER	
				Adjusted	HIGHEST	GW-3 INT,	GW-3	GW-3	
				For Dilution	10*AWQC PQL, Bckgrnd	Ceiling 1/2 Sol.	PROPOSED STANDARD (raw value)	PROPOSED STANDARD (rounded)	
				ug/L	ug/L	ug/L	ug/L	ug/L	BASIS
TOTAL PETROLEUM HYDROCARBONS									
Aliphatics									
C5 to C8	3900	Hexane - EC50/45 mm		39000	39000	39000	39000	40000	Aquatic
C9 to C12	1800	Daphnia mortality - dec		18000	18000	18000	18000	20000	Aquatic
C9 to C18	1800	Daphnia mortality - dec		18000	18000	18000	18000	20000	Aquatic
C19 to C35	21000	Cyclododecane - Daph		210000	50000	50000	50000	50000	Ceiling
Aromatics									
C9 to C10	430	ethylbenzene		4300	4300	4300	4300	4000	Aquatic
C11 to C22	300	PAHs		3000	3000	3000	3000	3000	AWQC

LEACHING-BASED
SOIL CONCENTRATIONS

OIL OR HAZARDOUS MATERIAL	S- /GW1 mg/kg	S- /GW2 mg/kg	S- /GW3 mg/kg
TOTAL PETROLEUM HYDROCARBONS			
Aliphatics			
C5 to C8	3.4E+03	8.4E+03	3.4E+05
C9 to C12	1.4E+05	3.5E+04	6.9E+05
C9 to C18	4.9E+05	1.2E+05	2.5E+06
C19 to C32			
Aromatics			
C9 to C10	3.4E+02	1.7E+03	1.4E+03
C11 to C22	1.7E+02	4.2E+04	2.5E+03

UCLs

OIL OR HAZARDOUS MATERIAL	UCLs	
	in GW µg/l (ppb)	in Soil µg/g (ppm)
TOTAL PETROLEUM HYDROCARBONS		
Aliphatics		
C5 to C8	100000	5000
C9 to C12	100000	20000
C9 to C18	100000	20000
C19 to C32	100000	20000
Aromatics		
C9 to C10	100000	5000
C11 to C22	100000	10000

REPORTABLE CONCENTRATIONS

OIL OR HAZARDOUS MATERIAL	Groundwater		Soil	
	RCGW-1 $\mu\text{g/l}$	RCGW-2 $\mu\text{g/l}$	RCS-1 mg/kg	RCS-2 mg/kg
TOTAL PETROLEUM HYDROCARBONS				
Aliphatics				
C5 to C8	400	1000	100	500
C9 to C12	1000	1000	1000	2500
C9 to C18	1000	1000	1000	2500
C19 to C32	5000	50000	2500	5000
Aromatics				
C9 to C10	200	4000	100	500
C11 to C22	200	3000	200	2000